ation, and no one who has seen the development of the reptilian material from its matrix under the care of Prof. H. G. Seeley can regret that certain specimens, at any rate, have travelled across the sea to England.

G. A. J. C.

THE CLIMATE OF SOUTH AMERICA.[1]

IN the volume mentioned below, all the mean values of the meteorological elements which constitute the climate of the country in question are brought together, these values being deduced from a long series of observations terminating with the year 1900. When it is mentioned that the country embraces 33° of latitude, the surface of which slopes from the shores of the Atlantic on the east to the snow-clad summits of the central range of the Andes on the west, the reader must not be surprised if he finds great differences in the atmospheric conditions that prevail in the various parts of the Republic.

A thorough knowledge of the changes in the meteorological elements in this the South American portion of the globe will prove of great importance to us dwellers in the Old World, for although we are separated so widely as regards distance, we are intimately connected meteorologically. It is quite within the bounds of possibility that our great dependency India and the region about it (and indirectly the British Isles and Europe generally) may be able to check their long period forecasts on observations made in the Argentine Republic.

In this volume an English translation accompanies the Spanish text, so that the book is available to those who cannot read the latter language. In addition to the numerous tables showing the mean daily and annual variations of the elements, accompanied by an excellent statement in each case, Prof. Davis has given a set of twenty-six plates which illustrate graphically not only these variations, but the mean conditions which prevail over this extensive area.

For many of the elements the monthly and yearly values for each year since the commencement of observation are included, but an omission is made in the case of atmospheric pressure. Recent investigations have indicated that the variations from year to year over the South American continent, more especially about the region of Cordoba, are the inverse of those about the region surrounding the Indian Ocean, that is, when the mean pressure for the year is high in Cordoba it is low in India; the insertion of the pressure values in this volume for one station, namely, Cordoba, would have been very useful.

For climatological reasons it is necessary to study the readings of many barometers well scattered over a country, hence the statement on p. 45 that "observations of atmospheric pressure, however complete, are of little practical value if confined to a single place. . . ." It is important, however, to bear in mind that complete series of barometric observations at two stations, one set to check the other, are quite sufficient in many parts of the world to study the changes over large areas from year to year.

The publication of this volume will undoubtedly be welcomed by meteorologists and those who wish to make themselves acquainted with the weather of the region surveyed, and the very complete manner in which the information has been brought together in this convenient form should add to its usefulness.

W. J. S. L.

NOTES.

A CIRCULAR signed by Prof. A. Tonelli and Prof. V. Cerruti announces that it is proposed to erect a memorial in honour of the late Prof. Luigi Cremona, professor of higher geometry in the University of Rome, and director of the engineering school. The fame of Prof. Cremona is world-wide, and his works have exercised a great influence on research in fields of pure and applied mathematics. It is intended that the monument to his memory shall be an international one; and the hope is expressed that all who have been inspired by his discoveries, or have regard for his genius, will contribute to the fund being raised. Subscriptions should be sent to Signor I. Sonzogno Piazza San Pietro in Vincoli, 5, Rome.

AT a meeting of the Bath Town Council on Tuesday, mention was made of the fact that helium has been found in gases from the largest and perhaps the best known of the city's hot mineral springs, the King's Bath. The deposits that collect in the tanks and pipes at the three springs have also been investigated. A few weeks ago a quantity of the deposit from the new Royal spring was obtained and sent to the Hon. R. J. Strutt, who, in a communication to the Baths Committee, remarks:—"My experiments have led to some conclusions which may, I hope, interest the committee. I have found that the deposit contains radium in appreciable quantities, though I am sorry to say not enough to pay for extraction. It will be remembered that the gas which bubbles up from the springs contains a small proportion of helium. Sir William Ramsay has recently made the most important discovery that radium slowly evolves helium by a spontaneous change. I think there can be little doubt that the helium of Bath owes its origin to large quantities of radium at a great depth below the earth's surface. A little of this radium is carried up by the rush of hot water and is found in the deposit. My experiments promise further interesting developments, which I shall have much pleasure in bringing to the notice of the committee in due course."

A MEETING was held in the house of the Zoological Society on Tuesday to consider proposals for the organisation of zoologists. Forty-one zoologists from England, Scotland and Ireland attended the meeting. The following resolution was carried by a large majority:—"That it is desirable that the zoologists of Great Britain and Ireland be organised for the consideration of all matters affecting the interests of zoology and zoologists, and to take such action as may seem desirable." A committee consisting of Prof. Cossar Ewart, Prof. Bridge, Prof. Hickson, Dr. Scharff, Dr. G. C. Bourne, Dr. Ridewood, and Mr. Cunningham was appointed to draw up a scheme.

WE are glad to see among the New Year honours gazetted by the India Office the name of Dr. W. T. Blanford, F.R.S., who has been made a Companion of the Order of the Indian Empire. Dr. Blanford, whose services to Indian geology and zoology are known to all our readers, joined the Geological Survey shortly before the outbreak of the mutiny, and is one of the few civilians entitled to wear a Mutiny medal.

ON New Year's Day we had the pleasure of inspecting a series of the well-known animal photographs of the Messrs. Kearton now being exhibited to the public at 175 Bond Street. All these reproductions from the original photographs have been considerably enlarged, although not to such an extent as to impair the sharpness or blur the details. The owners are to be congratulated, not only on the general character of the exhibition, but likewise on the fact that none of the photos have been "touched up." Mr. Cherry Kearton specially prides himself on the photo of a great crested grebe on her nest, which took seven days' watching before it could be secured.

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[1] "Climate of the Argentine Republic." Compiled from Observations made to the end of the Year 1900. By Walter G. Davis, Director of the Argentine Meteorological Office. Pp. 154; 26 plates. (Published by the Ministry of Agriculture.)

SIR WILLIAM RAMSAY, K.C.B., will, we learn from *Science*, give a course of lectures during the summer session at the University of California on "The Constituents of the Atmosphere and the Emanations from Radium."

THE year 1905 being the tenth anniversary of Röntgen's discovery of the X-rays, it is proposed to commemorate the occasion by holding in Berlin a Röntgen congress, together with a Röntgen exhibition. Information regarding the arrangements will be obtainable from Prof. R. Eberlein or Dr. Immelmann, of Berlin.

A SPECIAL meeting of the Berlin Geographical Society will be held on January 13 to greet the members of the German Antarctic Expedition and receive the report of Prof. E von Drygalski on the course and results of the expedition. An address will be given by Prof. Vanhöffen on the fauna of south polar regions.

ON Tuesday next, January 12, Prof. L. C. Miall will commence a course of six lectures at the Royal Institution on the "Development and Transformations of Animals." On Thursday, January 14, Mr. G. R. M. Murray will deliver the first of three lectures on the "Flora of the Ocean," and on Saturday, January 16, Mr. J. A. Fuller-Maitland will begin a course of three lectures on "British Folk-Song." The Friday evening discourse on January 15 will be delivered by the Right Hon. Lord Rayleigh, his subject being "Shadows"; on January 22 by the Rev. W. Sidgreaves, on "Spectroscopic Studies of Astrophysical Problems at Stonyhurst College Observatory"; and on January 29 by Mr. D. G. Hogarth, on "The Marshes of the Nile Delta."

CAPTAINS S. P. JAMES AND W. GLEN LISTON, of the Indian Medical Service, write from Simla to point out that the third volume of Mr. F. V. Theobald's work on the Culicidæ contains reproductions of portions of plates which they have prepared for a monograph on Indian Anopheles, and that statements are made in a number of cases without reference to the work of the individual observers upon whose results they are based. We have referred the matter to Mr. Theobald, who writes:—"I much regret that the plates and information to which they refer should have been published without acknowledgment in my book. The omission was due entirely to inadvertence, occasioned by the press of matter calling for record in the work. Steps are being taken to remedy the error."

WE learn from *Science* that the following Bill has been introduced into the U.S. House of Representatives and referred to the committee on coinage, weights and measures:—"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That on and after the first day of January, nineteen hundred and five, all the Departments of the Government of the United States, in the transaction of all business requiring the use of weight and measurement, except in completing the survey of public lands, shall employ and use only the weights and measures of the metric system; and on and after the first day of January, nineteen hundred and six, the weights and measures of the metric system shall be the legal standard weights and measures of and in the United States."

THE Australian mail has brought the report of the meeting of the Linnean Society of New South Wales on November 25 last, from which we learn that the chairman made a preliminary announcement respecting the Macleay fellowships endowment—the late Sir William Macleay's last and crowning benefaction to science. Subject to a life-interest in the principal on the part of his widow, lately deceased, Sir William bequeathed to the Society the sum of 35,000*l.* for the foundation and endowment of research fellowships, tenable by graduates in science of the University of Sydney upon certain conditions specified in the testamentary directions. On October 24, 1903, the executors paid to the Society the sum of 33,250*l.*, which the council has since invested at 4 per cent. per annum. The council does not expect to be in a position to make appointments to the fellowships before about the middle of this year.

THE *Times* publishes the following communication from its Madrid correspondent:—"In anticipation of the total eclipse of the sun of August, 1905, the papers are beginning to urge the Government to include in the Estimates for 1904 an item providing for a scientific mission of Spanish astronomers to be sent abroad, in order to study in foreign observatories the latest methods of investigating the phenomenon. For the eclipse of 1900 the Cortes voted 190,000 pesetas, but the measure was taken so late that the money was spent at a loss. It may be mentioned that the zone of about 200 kilometres covered by the eclipse of 1905 traverses Spain from Galicia and Asturias to Valencia and Castellon. The northern coast between Coruña and San Vicente de la Barquera, and the eastern from Valencia to the Gulf of San Jorge will be included in the zone of total obscurity. Observers at Ferrol, Lugo, Oviédo, Gijon, Léon, Palencia, Burgos, Soria, Teruel, and Saragossa will have some four minutes in which to make their observations. Madrid lies to the south of the zone of total eclipse. It would be well if foreign astronomers would lend their sympathy to Spanish students to facilitate the preparations for the most effective utilisation of these precious moments."

WITH the daily weather report for January 1 the Meteorological Office issued a small subsidiary chart showing the total rainfall in 1903 at those stations which report by telegraph, together with the percentages of the average annual fall for the thirty-five years 1866–1900. The chart shows very clearly the general distribution of the rainfall of the year, so far as it is represented by the stations referred to. The greatest fall, 67 inches, occurred at Valencia, 120 per cent. of the yearly average. At Stornoway the amount was 62 inches, 133 per cent. of the average (46·62 inches), this latter value being nearly 10 inches less than the normal fall at Valencia. The smallest falls occurred on the east and south-east coasts of England; at Yarmouth the rainfall was only 24·83 inches, 95 per cent. of the average (26·40 inches). The greatest percentage *excess* was registered in London, the aggregate amount being 38 inches, 156 per cent. of the average annual fall, and at Oxford the rainfall amounted to 142 per cent. of the average. At Greenwich (not shown on the chart) the rainfall for the year was 35·58 inches, being 11·43 inches above the average for sixty years; there were 184 rainy days. The previous largest fall there in this period was 34·01 inches in the year 1852.

SOME of the smaller shell-fish, especially cockles, have recently been found to be grossly contaminated with sewage. These fish form a staple article of diet among the poorer classes, and since they are cooked before consumption, it might be thought that the bacillus of typhoid fever would be destroyed and the molluscs rendered harmless thereby; but this cooking is a very perfunctory process, and consists in plunging netfuls of the live fish, the shells of which are tightly closed, into a vessel containing boiling water. The immersion of the cold mass immediately lowers the temperature, and when, in the course of two or three minutes, the water begins to boil again, the nets are lifted out. The scalding kills the fish and causes the shells to open, but does not sterilise the contents, and fish that had been kept in typhoid polluted water were found to be swarming with live bacilli after this process of cooking. Prolonged boiling would be effective, but causes the fish to shrivel and spoils them for sale. Dr. Klein suggested that cooking by steam might be found to sterilise efficiently without spoiling the fish as food, and some experiments have recently been carried out for the Fishmongers' Company with a view to test this. Two batches of molluscs were cooked, one for ten minutes and the other for five. The steamer used was a vessel two feet deep, the fish being distributed in three layers on trays, the steam being introduced by a pipe about an inch from the bottom. The results were:—ten minutes, mussels spoilt and useless, cockles all right in upper layer, bottom layer overcooked; five minutes, mussels all right, and also two upper layers of cockles, but bottom layer of cockles less satisfactory. The bacterial results were that the cockles proved to be sterile in all cases. The mussels were also sterile, except some in the top layer steamed for five minutes, which still contained some living spores. As a result of these experiments the Fishmongers' Company feels justified in strongly recommending a substitution of steaming for boiling to the trade.

DISCUSSING the subject of nuclear division without cell division, Mr. Ralph Lillie suggests that mitosis is an incidental consequence of the passage of the chromatin into the strongly acid and chromatic phase. This change, he believes, involves the acquisition by the chromatin of a negative charge of considerable potential, as a result of the inductive action of which there ensues a redistribution of the ions in the cytoplasm with the production of certain differences of electrical potential. To these potential differences are due the appearance of the astral radiations and the diminution of surface tension that leads to cleavage (*Biological Bulletin*, vol. iv. No. 4).

IN a paper in the *Technology Quarterly* (vol. xvi. No. 3) Messrs. C. E. A. Winslow and C. P. Nibecker discuss the significance of bacteriological methods in sanitary water analysis. They consider that the real application of chemistry begins where that of bacteriology ends. When pollution is so gross that its existence is obvious and only its amount need be determined, the bacteriological tests will not serve on account of their excessive delicacy. In studying the gross pollution of streams, treatment of trades' wastes, and purification of sewage, the relations of nitrogenous and oxygen compounds are of prime importance, that is, when pollution is to be avoided because the decomposition of chemical substances causes a nuisance, it must be studied by chemical methods. When the danger is that of infection, and arises only from the presence of bacteria, bacteriological methods furnish the best index of pollution. With regard to methods, the authors express a preference for the use of the fermentation tubes, and of gelatin, and of lactose agar, plates.

THE secretary of the Durham College of Science, Newcastle-upon-Tyne, writes to supplement the remarks respecting the conditions on which women can obtain degrees in the University of Durham, contained in an article on the higher education of women published in our issue of December 24, 1903. Residence in Durham is necessary only for women proposing to take a degree in arts of the Durham University; for Durham degrees in science, medicine, &c., attendance at the Durham College of Science and the University of Durham College of Medicine is the qualification, and there are many women undergraduates at these colleges in Newcastle-upon-Tyne.

IN the December number of the *Zoologist* Mr. A. H. Cocks discusses the length of the period of gestation in the badger, which he is inclined to think is nearer a twelvemonth than the four and a half months assigned to it by Mr. Meade-Waldo.

THE homology and classification of the tines developed in the crown of the antlers of the Carpathian red deer form the subject of an article by Dr. E. Botezat in Gegenbaur's *Morphologisches Jahrbuch* (vol. xxxii. part i.). In an appendix the author records the existence of what he regards as two local races of the species, for which the names *Cervus vulgaris campestris* and *C. v. montanus* are proposed. It may be pointed out, in the first place, that *C. vulgaris* is not the name of the red deer, and, in the second place, that *C. v. campestris* is preoccupied by *C. campestris*, one of the names of the South American pampas deer.

Bulletin No. 41 of the entomological division of the U.S. Department of Agriculture is devoted to an account of the life-history of the codling-moth and the damage inflicted by its caterpillar on orchards. The author, Mr. C. B. Simpson, states that this now cosmopolitan insect was introduced into the North-west Pacific States about the year 1880. On account of the genial climate of this new habitat two overlapping annual broods are now produced, and if proper preventive measures are not taken to keep them in check, the entire apple-crop in many districts is liable to damage. The best remedial measures appear to be arsenical spraying and banding, and by these means the damage to the crop in one case has been reduced from between 40 and 60 per cent. to as low as 10 per cent., while it is estimated that by continuing the process for a few years the injury inflicted by this insect might in any locality be reduced from nearly 100 per cent. to 5 or 10 per cent. The annual shrinkage in value of American apple-crops owing to the ravages of this moth has been estimated at 11,000,000 dollars.

THE seas of Japan, Okhotsk, and Bering have been attracting of late a great deal of attention from both Russian and American explorers. M. P. Schmidt gives now, in a recent issue of the *Izvestia* of the Russian Geographical Society (1903, ii.), a short sketch of the physical geography of these seas, with a list of 133 species of fishes found in them, and their distribution, the list being based both on previous research and the author's own collection, which contains 100 species.

THE hydrographic expedition of M. L. S. Berg, which has collected interesting data concerning the present rise of level of Lake Aral, has also studied the temperature, the currents of the lake and its salinity (specific gravity from 1·0076 to 1·0080 in the middle parts, and up to 1·0084 and 1·0090, occasionally 1·0094 in sheltered bays). The plankton is poorer than in European lakes, and during the hot days it keeps at a certain depth, coming to the surface only in the moonlight. M. S. A. Zernoff, who has studied the Aral collections, has found in them quite a number of forms which had only been met with in the Caspian Sea, and had only lately been described by Prof. Sars. The expedition has also collected ants, lizards, and other specimens of interest to naturalists.

THE *Century Magazine* for January contains an illustrated article on radium by Prof. E. Merritt, and one on radium and radio-activity by Mme. Curie. The extraction and properties of the new element are also described in the *Strand Magazine*, in the course of an illustrated interview with M. Curie.

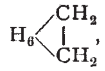
THE bound volume for 1903 of *Knowledge*, which has now been published, makes a very attractive book. It is profusely illustrated, and, as usual, the astronomical plates are particularly good. The magazine has just been incorporated with the *Illustrated Scientific News*, and the combined journal will be published under the joint title of *Knowledge and Illustrated Scientific News*.

THE second part of vol. ii. of "The Fauna and Geography of the Maldive and Laccadive Archipelagoes," being the account of the work carried on and of the collections made by an expedition during the years 1899 and 1900, has been published by the Cambridge University Press. This part, edited by Mr. J. Stanley Gardiner, contains the following three reports:—marine mollusca, by Mr. Edgar A. Smith; the Enteropneusta, by Mr. R. C. Punnett; and marine Crustacea—the spider-crabs (Oxyrhyncha) and the classification and genealogy of the reptant decapods—by Mr. L. A. Borradaile. The third part of vol. ii. is to be published on May 15.

WE have received the second series of vol. viii. of the "Proceedings and Transactions of the Royal Society of Canada," and notice that it contains a full account of the twenty-first general meeting held at Toronto in May, 1902. The presidential address, by Sir James A. Grant, K.C.M.G., had for its subject the universities in relation to research, and constitutes the first appendix to the first part of the volume, which includes the *Proceedings*. The second appendix contains reports from twenty-seven associated literary and scientific societies in Canada, some of the reports being in French. Similarly the section of the *Transactions* dealing with French literature, history, and archæology is given in French. Among papers read before the section concerned with the mathematical, physical, and chemical sciences may be mentioned:—On the stresses developed in beams loaded transversely, by Prof. H. T. Bovey, F.R.S.; researches in physical chemistry carried out in the University of Toronto during 1901–2, by Prof. W. L. Miller; on the existence of bodies smaller than atoms, by Prof. Rutherford; on the absolute value of the mechanical equivalent of heat, by Prof. H. T. Barnes; and the specific heats of organic liquids and their heats of solutions in organic solvents, by Dr. J. W. Walker and Dr. J. Henderson. In the section of the geological and biological sciences twelve papers are included, and among them are two by Prof. D. P. Penhallow on *Osmundites skidegatensis* and notes on Cretaceous and Tertiary plants of Canada. Dr. G. F. Matthew contributes notes on Cambrian faunas, and Prof. A. P. Coleman discusses the classification of the Archæan. The volume contains numerous well executed illustrations, and is an excellent witness to the value of the work in science which is being accomplished in Canada.

THE determination of the density of chlorine gas is attended with many experimental difficulties, and the figures obtained by different workers vary between 2·448 and 2·491. In the current number of the *Comptes rendus* MM. H. Moissan and Binet du Jassoneix describe their researches on this subject. Three groups of experiments are given, involving seventeen determinations, and the final figure regarded as the most probable is 2·490 at 0° C., a value identical with the figure of Leduc. The chief sources of error to be eliminated are the presence of air in the density flask, the difficulty of completely drying the gas, and the solubility of different gases in liquefied chlorine.

IN a recent number of the *Comptes rendus* it is stated by M. Becquerel that when crystals of hexagonal zinc blende are crushed between glass plates they emit a flash of light comparable with that which is produced by the proximity of a radium salt in Crookes's spinthariscope. It is suggested that in the latter case the positively charged α-particles fracture by their impact the surface of the blende, and that the flashes of light observed are thus caused by a mechanical action on the screen.

THE origin of natural asphalte or bitumen has given rise to much speculation, and the suggestion has been made that it is produced by the destructive distillation of vegetable remains mixed with organic matter, and especially with fish. Another possible explanation is suggested by the production of an artificial asphalte by heating natural petroleum with sulphur. The series of paraffins is not affected by this treatment, but the naphthenes which are present in the petroleum undergo condensation and give rise to bodies which may be regarded as typical constituents of asphalte. Two of these, prepared by the action of sulphur on acenaphthene,  $\mathrm{H_6}\Big\langle\begin{array}{l}\mathrm{CH_2}\\ \,|\\ \mathrm{CH_2}\end{array}$, have recently been described by Karl Dziewonski in the *Berichte*. The first is a hydrocarbon, $C_{36}H_{18}$ (trinaphthylene benzene), melting at 387° C., which contains no less than ten independent ring systems, and is therefore named decacyclene, whilst the second is a sulphur-compound, $C_{24}H_{12}S$ (dinaphthylenethiophen), melting at 278° C.

THE additions to the Zoological Society's Gardens during the past week include a Mozambique Monkey (*Cercopithecus pygerythrus*) from East Africa, presented by Lady Amherst; a Patas Monkey (*Cercopithecus patas*) from West Africa, presented by Mr. F. A. Knowles; a Lesser White-nosed Monkey (*Cercopithecus petaurista*) from West Africa, presented by Mr. G. A. Hanton; a Black-backed Jackal (*Canis mesomelas*) from South Africa, presented by Captain Moseley; a Hairy-rumped Agouti (*Dasyprocta prymnolopha*) from Central America, presented by Mr. John Gordon; two Ring-tailed Coatis (*Nasua rufa*) from South America, presented respectively by Mr. H. Everest and Mr. D. F. Mackenzie; a Water Rail (*Rallus aquaticus*), British, presented by Mr. F. W. Pizzey; a Californian Sea Lion (*Otaria californiana*) from the North Pacific Ocean, seven Indian Fruit Bats (*Pteropus medius*) from India, deposited.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL CALENDARS FOR 1904.—The "Annuaire du Bureau des Longitudes" for 1904 contains more than 700 pages of useful tables and formulæ, astronomical and physical, including lucid explanations of such matters as the several different calendars, the tides, &c. A new arrangement is inaugurated in this year's publication; instead of giving the customary complete set of tables, &c., only those relating to astronomy, physics, and chemistry are included, and it is proposed to omit the chemistry and physics next year, giving instead full sets of tables relating to general geography, meteorology, and statistics. This alternation will be continued in future "Annuaires."

The "Annuaire astronomique et météorologique," compiled by M. Camille Flammarion, attains its fortieth year of publication in the issue for 1904. It gives a complete account of the astronomical occurrences due this year, and a useful review of the astronomical and meteorological